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TITLE: The Effect of Interactive Simulations on Exercise Adherence with Overweight and Obese Adults

PRINCIPAL INVESTIGATOR: LTC Melba C. Stetz, PhD

CONTRACTING ORGANIZATION: University Clinical Education & Research Associates  
(UCERA)  
Honolulu, Hawaii 96813

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14. ABSTRACT This study examines the effects of interactivity with video games and simulations on exercise adherence, exercise motivation, and self-efficacy in overweight and obese Army personnel. Although increased activity level has proven to be a critical element in weight loss and improved health, adherence to physical exercise programs has been problematic. Two important mediators of this relationship are self-efficacy and motivation to exercise. In an effort to improve exercise adherence and longer-term health outcomes, the proposed study implements a novel approach for remediating this problem by pairing game play on an interactive simulation during exercise on an exercise bicycle. Healthy active duty military personnel and Department of Defense beneficiaries will be randomized into 2 exercise groups, i.e., enhanced video game exercise bicycle group or standard exercise bicycle group. The project team developed a prototype stationary exercise bicycle with video game play capabilities. A 6-month prospective repeated measures experimental design will be used to evaluate differences across time in exercise adherence, self-efficacy, and exercise motivation, and, secondarily, cardiovascular fitness, exercise behavior indicators, health perceptions and quality of life. The study is intended to be a concept study for exercise adherence improvement, and not a clinical trial.					
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## INTRODUCTION:

This study examines the effects of interactivity with video game play on exercise adherence, exercise motivation, and self-efficacy in overweight and obese Army personnel. Many active duty personnel are challenged by overweight and obesity. The 2003 Institute of Medicine (IOM) report on weight management in the military found that 46% of Army men and 34% of Army women were overweight, and over 13% of the men and 5% of the women met the criteria for obesity. The findings for Navy and Air Force personnel were slightly higher, with overweight rates of 53% for Navy and Air Force men, and 39% and 31% for Navy and Air Force women, respectively. The obesity rates for males were 14% (Navy) and 11% (Air Force), while the rates for women were 7% (Navy) and 3% (Air Force)<sup>1</sup>. These conditions adversely impact military readiness and mission-related success. Regular exercise is especially critical in any weight-loss treatment for obesity due to its ability to improve cardiovascular fitness, metabolic profiles, and long-term weight-loss maintenance results<sup>2</sup>. It has also consistently been shown to be an effective element in improving physiological, psychological, and behavioral outcomes<sup>3</sup>. Adherence to physical exercise programs has been problematic. Factors that are associated with long-term adherence are motivation, multiple short bouts of exercise throughout the day, no requirement to exercise in the gym or special facility, moderate rather than vigorous exercise intensity, and continuous brief encouragement<sup>4, 5, 6</sup>. Factors associated with attrition were no weight loss, no motivation, embarrassment related to weigh-ins, high treatment cost, transportation difficulties, no availability of low-cost healthy food, change in job or roles, reduction in tobacco products, relationship difficulties, pregnancy, and the belief that weight-loss could be done more effectively on one's own than in a treatment program<sup>4, 7</sup>. Interactive simulations such as video games are highly engaging and provide positive visual and auditory stimulation that may allow participants to enhance and maintain positive exercise behaviors.

The project randomizes 60 active duty military participants into 2 exercise groups (see Task 1 below for submitted request for change to sample size) - one using video game-enhanced exercise bicycles and the other using non-enhanced exercise bicycles. A repeated measures experimental design is used to evaluate group differences in exercise adherence, self-efficacy, and exercise motivation. Measurements will be taken initially as well as three additional points (2 months, 4 months, 6 months). Secondary variables include cardiovascular fitness, exercise behavior indicators, physiologic changes, health perceptions, and quality of life. The longer-term goal of this effort is to improve the readiness of military personnel and the health status of the general public through the study of innovative applications of new and emerging technologies to treat behavioral health disorders.

## BODY:

### *Task 1: Submit protocol for IRB and second level review approval*

The Start Letter was received on Dec 20, 2010. However, upon request of the funding mechanism (TATRC/Pacific-Hui) the PI submitted an amendment to the local IRB on 12<sup>th</sup> JUL 2011 to increase the sample size from 60 to 88 and to add a follow-up point two months after participants' last intake. The PI is still awaiting the response of the local IRB.

### *Task 2: Evaluate, purchase, setup equipment and physiologic monitors*

Unique software was written to integrate the exercise equipment/video game components, and to capture and transfer data from the exercise bicycle ergometer to the study database computer. However, due to equipment malfunction and lack of technical support the PI was forced to come up with an alternative solution. The PI decided to abandon the original automatic exercise bike/PC setup and purchase replacement exercise bikes, digital scales and wireless heart rate monitors for manual data collection instead.

### *Task 3: Develop, install, test software to capture exercise data*

N/A. The original automatic exercise bike/PC setup was abandoned and data collection is now captured manually.

*Task 4: Hire & train research staff on equipment and protocol procedures*

Research Assistants were hired and are currently collecting data.

*Task 5: Pilot test procedure & equipment on 5 volunteers (no data collection)*

The final testing of the exercise equipment has been completed.

*Task 6: Recruit & identify participants*

Sixty participants have been identified and recruited during the year.

*Task 7: Assess, randomize, run study*

Participants were randomly assigned to their respective conditions (TV/Game) and collection of data has been ongoing throughout the year.

*Task 8: Analyze data and complete final report*

Discussion has been initiated with the COR regarding the possibility of requesting a final no-cost extension, while we are awaiting a response from the local IRB in regards to the submitted amendment.

Provided that the NCE gets approved the final report will be prepared in the end of the extended period.

**RESEARCH ACCOMPLISHMENTS:**

- Submission of amendment.
- Recruitment completed
- Data collection completed.
- Primary analysis of data has commenced.

**REPORTABLE OUTCOMES:**

We have recruited and ran all sixty participants allowed by the current protocol. We are currently waiting the IRB response in regards to the submitted amendment to have the sample size increased from 60 to 88 participants.

**CONCLUSION:**

It is expected that all the data should be collected and analyzed during the next performance period, and a summary of the results and their impact will be discussed.

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**SUPPORTING DATA:**

Not applicable at this time.